2.1.2 SBEM

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name **Shell and Core**

Project Queen Tesco

As built

Date: Mon Nov 18 15:48:50 2024

Administrative information

Building Details

Address: Unit 2, Newsprint Avenue, Panattoni Park, Bellingham Way, Aylesford, ME20 7DL

Certifier details

Name: Vanessa Vienna

Telephone number: 0161 529 5901

Address: Flat Iron House 28 Marshalsea Road, London, SE1 1HF

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.1

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m^2]: 7113.12

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	0.99	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	0.71	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	10.29	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	6.44	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.16	0.19	Ambient chamber 2 - Recycle area 1_W_3
Floors	0.18	0.07	0.07	Goods in GF - office_S_6
Pitched roofs	0.16	-	-	No heat loss pitched roofs
Flat roofs	0.18	0.16	0.16	Goods in GF - office_R_10
Windows** and roof windows	1.6	0.35	1	Goods in GF - office_G_4
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	1.6	1.6	Goods in GF - office_D_5
Vehicle access & similar large doors	1.3	0.97	0.97	Ambient chamber 2 - Recycle area 1_D_9
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	1.24

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

"No HVAC systems in project"

1- Vmu and TSB DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	0
Standard value	1	N/A

2- Main DHW

	Water heating efficiency	**Storage loss factor [kWh/litre per day]**
This building	1	0.024
Standard value	1	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	**System type in the Approved Documents**
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter
NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.	

Zone name	**SFP [W/(l/s)]**									**HR efficiency**	
ID of system type	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	**Zone**	**Standard**
Goods in GF - office	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Goods in GF - lobby	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Ambient chamber 2 - store	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Ambient chamber 2 - Recycle area 1	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Ambient chamber 2 - Recycle area	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Ambient chamber - Ambient	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Goods out - Good out GF	-	-	-	-	1.5	-	-	-	-	0.75	N/A
Good In FF - Office	-	-	-	-	1.5	-	-	-	-	0.75	N/A
RSU - RSU	-	-	-	-	1.5	-	-	-	-	0.75	N/A

Shell and core configuration

Zone	**Excluded from calculation?**
VMU GF - VMU warehouse	YES
VMU GF - Area 1	YES
TSB FF - TSB area 1	YES
Battery charge area GF - Battery	NO

Shell and core configuration

Zone	Excluded from calculation?
TSB GF - TBS g	YES
VMU FF - Area 1	YES
Freezer chamber - Frozen chamber	YES
Block 4 - Chill Chamber1	YES
chilled chamber - Chill Chamber	YES
Good In FF - corridor	YES
Goods in GF - office	YES
Goods in GF - lobby	YES
Ambient chamber 2 - store	YES
Ambient chamber 2 - Recycle area 1	YES
Ambient chamber 2 - Recycle area	YES
Ambient chamber - Ambient	YES
Goods out - Good out GF	YES
Good In FF - Office	YES
RSU - RSU	YES

General lighting and display lighting	General luminaire	Display light source	
Zone name	**Efficacy [lm/W]**	**Efficacy [lm/W]**	**Power density [W/m²]**
Standard value	95	80	0.3
VMU GF - VMU warehouse	100	-	-
VMU GF - Area 1	100	-	-
TSB FF - TSB area 1	100	-	-
Battery charge area GF - Battery	100	-	-
TSB GF - TBS g	100	-	-
VMU FF - Area 1	100	-	-
Freezer chamber - Frozen chamber	100	-	-
Block 4 - Chill Chamber1	100	-	-
chilled chamber - Chill Chamber	100	-	-
Good In FF - corridor	100	-	-
Goods in GF - office	100	-	-
Goods in GF - lobby	100	-	-
Ambient chamber 2 - store	100	-	-
Ambient chamber 2 - Recycle area 1	100	-	-
Ambient chamber 2 - Recycle area	100	-	-
Ambient chamber - Ambient	100	-	-
Goods out - Good out GF	100	-	-
Good In FF - Office	100	-	-
RSU - RSU	100	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
VMU GF - VMU warehouse	NO (-95.5%)	NO
VMU GF - Area 1	NO (-97.3%)	NO
TSB FF - TSB area 1	N/A	N/A

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Battery charge area GF - Battery	NO (-80.3%)	NO
TSB GF - TBS g	N/A	N/A
VMU FF - Area 1	N/A	N/A
Freezer chamber - Frozen chamber	N/A	N/A
Block 4 - Chill Chamber1	N/A	N/A
chilled chamber - Chill Chamber	N/A	N/A
Good In FF - corridor	N/A	N/A
Goods in GF - office	NO (-39%)	NO
Goods in GF - lobby	NO (-26.6%)	NO
Ambient chamber 2 - store	NO (-96.7%)	NO
Ambient chamber 2 - Recycle area 1	NO (-96.7%)	NO
Ambient chamber 2 - Recycle area	NO (-94.7%)	NO
Ambient chamber - Ambient	NO (-96.8%)	NO
Goods out - Good out GF	NO (-51.3%)	NO
Good In FF - Office	NO (-27.6%)	NO
RSU - RSU	NO (-75.7%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	171.8	171.8
External area [m^2]	137853	137853
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	1	5
Average conductance [W/K]	20644	42549.2
Average U-value [W/m^2K]	0.15	0.31
Alpha value* [%]	4.97	19.96

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
100	**Storage or Distribution**
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	0	0
Cooling	0	0
Auxiliary	0	0
Lighting	8.38	10.02
Hot water	8.7	4.24
Equipment*	29.87	29.87
TOTAL**	**17.08**	**14.25**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	13.3	7.29
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*13.3*	*7.29*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	31687.6	73295.3
Primary energy [kWh_{PE}/m^2]	6.44	10.29
Total emissions [kg/m^2]	0.71	0.99

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] No Heating or Cooling										
	Actual	11387.8	14450.8	0	0	0	0	0	0	0
	Notional	35259	24416.1	0	0	0	0	0	----	----
[ST] Split or multi-split system, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

Addresses:

Unit 2 Newsprint Avenue Panattoni Park Bellingham Way,
Aylesford,
Kent ME20 7DL
United Kingdom

Dear Eight Versa,

With regards to the above project, I am writing to confirm that specifications and drawings provided represent the development as built and that the following as built performance standards have been achieved:

U Values: Exposed elements:

Exposed wall:

Ambient wall – U value- 0.19 W/(m2K)
Wall between ambient and chilled chamber – U value -0.13 W/(m2K)
Chilled chamber walls – U value - 0.13 W/(m2K)
Freezer walls – U value – 0.11 W/(m2K)
Goods in office walls – U value - 0.16 W/(m2K)
Goods out office walls – U value - 0.16 W/(m2K)
Battery area wall – U value - 0.16 W/(m2K)
RSU unit wall– U value - 0.16 W/(m2K)
VMU unit wall– U value - 0.16 W/(m2K)
TSB unit wall– U value - 0.16 W/(m2K)
Partition walls– U value - 0.48 W/(m2K)
Wall between heated and unheated zones – U value - 0.11 W/(m2K)

Ground floor:

Ambient chamber floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
Chilled chamber floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
Freezer chamber floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
Goods in office floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
Goods out office floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
Battery area floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
RSU unit floor - 0.07 W/(m2K) - U-value calculation provided (ref- Project Mary Tesco PA Calc Rev 02)
VMU unit floor - U value -0.29 W/(m2K)
TSB unit floor - U value -0.45 W/(m2K)

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Roof:

Chilled Roof - U value -0.13 W/(m2K)
Freezer Roof - U value -0.11 W/(m2K)
Ambient chamber roof - U value - 0.16 W/(m2K)
Goods in chamber roof - U value - 0.16 W/(m2K)
Goods out office roof - U value - 0.16 W/(m2K)
RSU unit chamber roof - U value - 0.16 W/(m2K)
VMU unit roof - U value - 0.16 W/(m2K)
TSB unit roof - U value - 0.16 W/(m2K)

Windows/Rooflights/Doors:

Windows: Double glazed unit– target 1.0 W/(m^2K), g-value of 0.27 and Lt value of 0.70 – U-value calculation provided ref (C882 Unit 2 Panattoni - Tech Submittal (23.05.24).

Rooflights: Double glazed unit– target 0.23 W/(m^2K), g-value of 0.01 and Lt value of 0.58 - U-value calculation datasheet provided ref (kingspan-quadcore-coldstore-panel-data-sheet-en-gb-ie)

Spender Glass : Double glazed unit– target 0.35 W/(m^2K), g-value of 0.01 and Lt value of 0.58 - U-value calculation provided ref (C882 Unit 2 Panattoni - Tech Submittal (23.05.24)

Solid entrance door – U -value -1.6 W/(m2K) - (Evidence provided ref- EDG-46, EDG -33)

Vehicle Access door -U -value - Weighted average 0.97 W/(m2K)

Air permeability:

Air permeability target 0.55 $m^3/(h.m^2)$ @50 Pa for Chill Chamber , Battery area, Good in and Goods out office (Evidence provided ref-11590088-Chiller Project Queen)
Air permeability target 0.83 $m^3/(h.m^2)$ @50 Pa for Ambient Chamber (Evidence provided ref -11590087-Ambient Project Queen)
Air permeability target 0.07 $m^3/(h.m^2)$ @50 Pa for Freezer (Evidence provided ref-11590108-Freezer Project Queen)
Air permeability target 15 $m^3/(h.m^2)$ @50 Pa for TSB unit, VMU unit and RSU unit – As per EPC conventions

Heating:

Spaces like goods in, good out, RSU unit office spaces and ambient chamber have been assumed to be heated and cooled. The warehouse areas of the Tesco Main Warehouse, TSB and VMU are unheated.

Heating and cooling have been assumed to be provided by a VRV/VRF, distributed via split system and is controlled by time and temperature local control.

The VRV/VRF has a cooling SEER 6.0, EER of 4.0 and heating COP 4 – as per BREEAM inputs

Hot water cylinder:

Hot water has been assumed to be provided by instantaneous electric heater with an efficiency of 1 – as per BREEAM inputs
Hot water storage loss:2.1kwh/day - Assumed

Ventilation:

All office spaces (good in office, goods out office, ambient chamber and RSU unit) spaces have been assumed to have mechanical ventilation with specific fan power (SFP) – 1.5 W/(l/s) and heat recover efficiency- 75% - as per BREEAM inputs

Good in office, goods out office, ambient chamber and RSU unit have demand control with speed control flow regulation as per BREEAM.

No other space has mechanical ventilation.

Lighting:

The following lighting has been assumed:
All Spaces has lumen efficacy of 100 lm/W – as per BREEAM inputs
Display lighting 80lm/W efficiency to reception– as per BREEAM inputs

Photoelectric controls are assumed to be installed all office spaces and warehouses with roof lights with parasitic power of 0.1 W/m^2 and 0.01 W/m^2 respectively (goods in, goods out, RSU unit and ambient warehouse) – as per BREEAM inputs

All the warehouses with photoelectric control(Ambient warehouse and VMU warehouse) have sensors to control back of the room -as per BREEAM inputs

Occupancy sensing has been assumed to all spaces with parasitic power of 0.1 W/m^2- as per BREEAM inputs

Renewables

Total no of PV's=1904
Module capacity -1MW
Module type – JA solar (525W)
Very little or none over shading has been assumed

For the purposes of energy calculations, Building Regulations and BREEAM applications the Contractor can assume that a minimum of 1.0 MWp PV installation will be installed on the roof of the Chilled and Frozen chambers of the building. The Tenant will confirm the exact size of the PV installation to be installed at a later date.